

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

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Paper No. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte ATSUSHI YAMAGUCHI  
and HIROYUKI FURUYA

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Appeal No. 1998-2675  
Application 08/779,024<sup>1</sup>

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HEARD: February 7, 2001

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Before KRASS, JERRY SMITH, and BARRETT, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

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<sup>1</sup> Application for patent filed January 6, 1997, entitled "Configuration Of Providing Microphone In Duct And Active Noise Reduction Device Using Same," which is a continuation of Application 08/300,079, filed September 2, 1994, now abandoned, which claims the foreign filing priority benefit of Japanese Application 5-341608, filed December 10, 1993.

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This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1, 3-5, and 8-11.

We reverse.

#### BACKGROUND

The invention is directed to a configuration in which a microphone is attached inside a duct for use in active noise reduction systems. A problem in active noise reduction systems is that the microphone provided in a duct picks up noise generated by the current of air which cannot be adequately suppressed by acoustic insulation. This noise consists of sounds made by the friction of air with the microphone and by the shaking movement of the microphone blown by an air current. Appellants' solution is to increase the cross sectional area of the duct, which reduces the velocity of the air current and, hence, the effect of the air current on the microphone.

Claim 1 is reproduced below.

1. A configuration of providing a microphone in a duct having an air current therein, for use in an active noise reduction device having said microphone pick up noise propagating in said duct, having a speaker producing sounds counteracting said noise, and having an auxiliary microphone provided downstream from said microphone for picking up remnant noise, said speaker and said auxiliary microphone forming a closed loop for

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suppressing said remnant noise, said configuration comprising:

an expanded room formed by enlarging an area of a cross section of part of said duct, said cross section being perpendicular to a direction of the air current, the air current having a decrease in velocity when coming into said expanded room,

wherein said microphone, provided upstream from said auxiliary microphone and farther from said speaker than said auxiliary microphone, is contained in said expanded room for picking up said noise, the decrease in velocity of the air current reducing an effect of the air current on said microphone in picking up said noise.

The Examiner relies on the following prior art:

Chaplin et al. (Chaplin)	4,527,282	July
2, 1985		
Rose et al. (Rose)	4,749,150	June 7,
1988		
Nelson	4,989,688	February 5,
1991		
Eguchi	5,278,780	January 11,
1994		
		(filed July 9,
1992)		
Gotoda et al. (Gotoda)	3-188798	August 16,
1991		
(Japanese Kokai)		

Claims 1, 10, and 11 stand rejected under 35 U.S.C.

§ 103(a) as being unpatentable over Eguchi and Chaplin.

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Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Eguchi and Chaplin, as applied in the rejection of claim 1, further in view of Rose.

Claims 5 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Eguchi and Chaplin, as applied in the rejection of claim 1, further in view of Gotoda.

Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Eguchi and Chaplin, as applied in the rejection of claim 1, further in view of Nelson.

We refer to the Final Rejection (Paper No. 17) and the Examiner's Answer (Paper No. 22) (pages referred to as "EA\_\_") for a statement of the Examiner's position and to the Appeal Brief (Paper No. 21) (pages referred to as "Br\_\_") for a statement of Appellants' arguments thereagainst.

OPINION

The claims are grouped to stand or fall together (Br3). Thus, claim 1 will be analyzed as the representative claim.

The Examiner cites Eguchi as teaching an active noise reduction (ANC) device as claimed. Appellants admit that ANC devices with an auxiliary microphone closer to a speaker than a noise pickup microphone exist, as shown in the admitted prior art of figure 2 and in Eguchi (Br5). The differences, as recognized by the Examiner (EA4), between Eguchi and the subject matter of claim 1 are that Eguchi (1) does not have an expanded room formed by enlarging an area of a cross section of part of the duct, and (2) does not locate the noise microphone, provided upstream of the auxiliary microphone, in an expanded room. The Examiner finds that Chaplin, figures 5-7, teaches a microphone in an expanded room for picking up noise, where the purpose of the expanded room is to protect the microphone under extreme conditions such as heat in the duct (EA4). The Examiner concludes that it would have been obvious, in view of Chaplin, to use an expanded room for housing the ANC device in Eguchi in order to protect the microphone under extreme conditions (EA5).

Chaplin discloses that in a prior art "virtual earth" active attenuation system shown in figure 1, a pressure-sensing microphone 1 is located a distance  $d$  from a loudspeaker (or driver) 2 in a closed feedback path to create a constant or null pressure. The smaller the distance  $d$ , the higher will be the critical frequency  $f_r$ , and the greater is the bandwidth over which the system can be used to achieve active attenuation (col. 1, lines 34-39). In order to minimize the delay around the loop and hence reduce instability, the microphone must be placed as close as possible to the loudspeaker (col. 1, lines 50-52). Thus, the microphone is located in the near field of the speaker where the sound pressure changes much more rapidly with distance as compared to some position more remote from the speaker (col. 1, lines 52-56). This means that the pressure waveform at the microphone 1 by the driver 2 matches the primary vibration field only over a very localized region of space, thus limiting the region of null pressure.

Chaplin discloses that the working range of a virtual earth system can be enhanced by feeding the vibrations of the driver into an acoustically partially closed volume whose

largest dimension is smaller than the wavelength of the highest frequency of the primary vibration to be nulled and locating the microphone in the volume (col. 2, lines 18-24). By enclosing the microphone and driver in a relatively small volume, the near field of the driver becomes much more uniform, the microphone is isolated from nearby reflecting surfaces, and the efficiency to null primary vibrations is increased (col. 2, lines 35-43). The primary vibrations to be canceled can be fed directly into the partially closed small volume or the primary vibrations can be sensed by a microphone upstream of the small volume, the output of the microphone being fed to the loop of the virtual earth system (col. 2, lines 44-52). Chaplin discloses that gas permeable thermal insulation can be included in the small volume 4" of figure 6 or surrounding the perforated pipe in figure 7 to protect the drivers and microphone from the heat of an engine.

Initially, we find that the purpose of the enlarged room in Chaplin is to make the pressure from the driver more uniform around the microphone, not to protect the microphone under extreme temperature conditions, as found by the Examiner; it is the thermal insulation included in the volume

that protects the microphone. Thus, the Examiner errs in finding that Chaplin suggests using an expanded room in order to protect the microphone under extreme conditions. Figure 5 of Chaplin shows a port P' connecting the volume 4' with the volume of the duct 14, but it is not clear that such an arrangement would necessarily cause a decrease in velocity, as claimed. Figure 7 of Chaplin shows a perforated tube surrounded by layers 5 of gas permeable thermal insulation extending through a volume 4'', but while the noise can penetrate the layers 5, it is again not clear that such an arrangement would necessarily cause a decrease in velocity, as claimed, because the layers 5 would interfere with the air expanding freely into volume 4''. However, figure 6 of Chaplin shows an enlarged room in a duct and we consider that teaching.

Appellants argue that Chaplin does not teach or suggest reducing an air current velocity in order to suppress the affect of the air current on the microphone and, thus, Chaplin does not recognize the problem which is solved by the present invention (Br6). Examiner states that recognition of



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advantages that are inherent cannot be the basis for patentability (EA8).

We agree with the Examiner that the structure of figure 6 of Chaplin would inherently cause the air current to have a decrease in velocity, although this is not expressly disclosed. However, such inherent characteristics cannot be relied upon as motivation to combine in an obviousness rejection. See In re Spormann, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966) ("That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown."). Thus, we are confined to the reasons for providing an enlarged room stated in Chaplin as motivation for the obviousness rejection. Chaplin discloses providing an enlarged room to make the pressure from the driver more uniform around the microphone.

Appellants argue that the prior art does not teach or suggest the claimed arrangement of a noise pickup microphone in an expanded room and its relationship to an auxiliary microphone and speaker as set forth in the claims (Br5). Appellants argue that the prior art provides no suggestion which would have led one of ordinary skill in the art to

modify Eguchi to place the microphone 3 of Eguchi in an expanded room (Br6). The Examiner responds that it would have been obvious to use an expanded room for housing the ANC device in Eguchi in order to protect the microphone under extreme conditions (EA7).

As we have noted, the purpose of the enlarged room in Chaplin is to make the pressure from the driver more uniform around the microphone. There is no reason why one skilled in the art, given the teachings of Chaplin, would have sought to locate the upstream noise pickup microphone of Eguchi in an enlarged room because it is not located next to a driver. Accordingly, we conclude that the Examiner has failed to establish a prima facie case of obviousness as to independent claims 1, 10, and 11. The references to Rose, Gotoda, and Nelson, applied to the dependent claims, do not cure the deficiencies of Eguchi and Chaplin. Thus, the rejections of claims 3-5, 8, and 9 are also reversed.

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CONCLUSION

The rejections of claims 1, 3-5, and 8-11 are reversed.

REVERSED

ERROL A. KRASS	)	
Administrative Patent Judge	)	
	)	
	)	
	)	
	)	BOARD OF PATENT
JERRY SMITH	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
	)	
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	)	
LEE E. BARRETT	)	
Administrative Patent Judge	)	

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